SYSTEM AND METHOD FOR ATTACHING COMPONENTS WITHIN AN INFLATABLE OBJECT

FIELD OF THE INVENTION

The invention generally relates to inflatable objects such as balloons, and more particularly, to a system to attach a component within the interior surface of an inflatable object.

BACKGROUND

There are, of course, many different types of inflatable objects such as balloons that are used for a wide variety of purposes, that is, for advertising, entertainment and simply for decorative adornment for a house or a festive occasion such as a birthday party or the like. In such cases, the balloon may be a typical metalized, bi axially oriented nylon film and where there is an internal layer of a sealant material such as polyethylene to seal the interior of the balloon and thus prevent the leakage of the gas, such as helium, to the exterior of the balloon envelope.

With such balloons, the balloons themselves are produced with automated equipment such that the balloon material comprising the nylon film and an interior polyethylene surface, is heat sealed together in forming the peripheral edge of the balloon. As a further feature of some balloons, there may be a component contained within the balloon envelope, and such component may be a sound module, light module or other merely decorative object, that is, a sound module capable of producing a desired sound or sounds upon activation thereof, a light module to produce a light and the like. As such, it is therefore necessary to incorporate certain additional steps into the manufacturing techniques normally used to produce the balloon in order to

facilitate the addition of the component and to produce a finished balloon having the component firmly affixed within the interior of the balloon itself.

Thus it would be advantageous to have a system that is capable of integration into the normal manufacturing procedures and steps in the production of a balloon without impeding the normal processing speed and techniques and which can, readily and fairly simply, position a component within the interior of a balloon and affix the component within that balloon such that the object is firmly affixed therein.

It would be further advantageous to provide a system for affixing a component such as a sound or light module firmly within the interior of a balloon where the system utilizes a series of steps that can be carried out with the use of automated equipment and which firmly bonds the component to the interior polyethylene surface of the balloon envelope.

SUMMARY OF THE INVENTION

The present invention comprises a system to firmly affix a component, such as a sound module, within the interior of a balloon and a balloon having the component so affixed. The following description will, for convenience, refer to the particular component as a sound module, however, it will be understood that there are a wide variety of other components that can be used in carrying out the present invention, including, but not limited to, light modules or decorative components.

In carrying out the invention a nylon film is continually moved along a track as is conventional in the present construction of a balloon. At predetermined intervals, the movement of the film is stopped in order to carry out the steps of the present invention.

Thus, the present invention can be readily integrated into the normal steps and procedures used in the present automated production of balloons and the additional steps that are added to the normal production steps do not slow or impede the present systems and methods to produce balloons.

As such, this invention permanently affixes a component, such as a sound module, to the internal surface of the nylon film that is normally used in the production of decorative balloons. Such nylon film is generally comprised of a metalized external skin (e.g., Mylar plastic) surface with an internal surface that is a polyethylene coating, although other internal surfaces can be utilized.

In any event, the nylon film travels with the polyethylene coated side facing upwardly. A component, such as a sound module that is generally comprised of alight foam material is moved into position atop of the nylon film in a position so as to be affixed thereto. In order to make the affixation of the sound module to the upper facing polyethylene surface of the nylon film, the surface of the module is coated with a material that is activated by heat, such as a heat activatable adhesive or a coating of a plastic such as polyethylene itself. In either event, the function of the heat activation is to make the material coating on a surface of the module take on an adhesive property so that it can be adhered to another surface.

In the case of a heat activatable adhesive, the heat converts the surface into an adherent surface and, in the case of a plastic material, such as polyethylene, the heat softens and melts the polyethylene material so that it can adhere to another softened polyethylene surface. The heat activatable material generally at least partially covers the surface of the module, such as along the peripheral area of the sound module. Thus, the bond, to be later described, is carried out by a heat and pressure bonding of the polyethylene side of the nylon film to the heat activatable material applied to the module.

In the aforedescribed steps of the invention, the sound module is preferably picked up from a conveyer belt or other source of multiple sound modules by the pick up head of a robotic arm and that pick up head may readily carry out the picking up of the module by applying a vacuum to the module to attach the sound module to the pick up head during the positioning of the sound module. As such, the pick up head of the robotic arm can position the sound module at the predetermined location upon the nylon film and the vacuum can be eventually dissipated so that the module will remain in affixed to the nylon film after the steps of the present invention have been accomplished.

Once the sound module has been deposited in the desired location atop of the nylon film, there is, in effect, a mating of the two surfaces, i.e. the upper, polyethylene surface of the nylon film and the lower surface of the sound module coated with a heat activatable material such that a heat and pressure sealing can be utilized to bond the two surfaces together to result in a good, permanent affixation of the sound module to the surface of the nylon film.

That heat and pressure sealing can be carried out with the use of a heater having a hot head that is movable between a location where the hot head is remote from the surfaces to be bonded together to a position where the hot head is located proximate to those surfaces, preferably underneath those surfaces and generally opposite to the location of the pick up head of the robotic arm. The hot head of the heater preferably has a external coating of polytetrafluoroethylene (Teflon) to prevent sticking and the hot head can be moved by means of a piston up against the nylon film where the sound module and the nylon film is sandwiched between the head of the robotic arm and the hot head of the heater.

Accordingly, there can be heat and pressure applied to the surfaces to be bonded, that is, the polyethylene surface of the nylon film and the heat activatable material coating on the module to bond those surfaces together at least around the peripheral area of the sound module to securely affix the sound module to the nylon film. In one embodiment, there may also be a sheet of protective material, such as polytetrafluoroethylene (Teflon) interposed between the hot head of the heater and the undersurface of the nylon film to prevent the hot head of the heater from actually contacting the nylon film during the application of heat and pressure to bond the sound module to the nylon film.

BRIEF DESCRIPTION OF THE DRAWINGS

A more complete understanding of the invention may be obtained from consideration of the following description in conjunction with the drawings in which:

FIG. 1 is a perspective view of a conveyer belt carrying sound modules to be used in the present invention,

FIG. 2 is a perspective view of the apparatus of the present invention with a sound module in position to be applied to a nylon film of an inflatable object;

FIG. 3 a perspective view of the apparatus of the present invention with a sound module in contact with the nylon film of an inflatable object;

FIG. 4 is a side view of the apparatus of the present invention with a heater located proximate to the nylon film to apply heat thereto; and

FIG. 5 is a perspective view of the apparatus of the present invention with the sound module affixed to the nylon film of an inflatable object.

DETAILED DESCRIPTION

In Fig. 1, there is shown a perspective view of a of a conveyer 10 that contains a plurality of components, such as sound modules 12 that are continuously supplied by the conveyer 10 to provide those sound modules 12 for use in carrying out the present invention. As can be seen, the conveyer 10 comprises a frame 14 with a plurality of movable members 16 that carry the sound modules 12 to the desired position. Obviously, the use of a conveyer 10 is but one means of providing a continuous supply of sound modules 12 for use herein, however, there may be many other systems that can make the individual sound modules 12 available on a continuous basis, it only being of importance that whatever means is employed, a continuous supply of sound modules 12 are available so as to not interrupt the automated procedures and steps in the construction of the final balloon product.

There can also be seen in Fig. 1, a robotic arm 18 that is used with the present 10 invention to pick up one at a time, the sound modules 12 from the conveyer 10 to move the sound module 12 to position it at a location to be secured to the interior of a balloon as will be later explained.

The robotic arm 18 generally comprises a pick up head 20 that is used to pick up an individual sound module 12 from the conveyer 10 and the pick up head 20 can be supplied by a source of vacuum so that the vacuum can be applied to the pick up head 20 to retain the sound module 12 to the pick up head 20 and, of course, the vacuum released to disengage the sound module from the pick up head 20, when desired. The robotic arm 18 also includes a horizontal member 22 that allows the movement of the pick up head 20 generally parallel to the floor and a vertical member 24 that allows the pick up head 18 to move vertically, all in accordance with the automated procedure programmed into the overall system.

Turning next to Fig. 2, there is shown a perspective view of a typical apparatus used to carry out the present invention. Accordingly, the pick up head 20 is positioned above the nylon film 26 and which has its upper surface comprised of a plastic material such as a polyethylene layer 28. The opposite surface of the nylon film 26, that is, the exterior surface, is a skin 30 of a metalized surface, such as is produced by vacuum metallization and which becomes the exterior surface of the end product balloon when the 10 completed balloon is produced. The nylon film 26 can be co extruded with or coated with the polyethylene layer 28 and that polyethylene layer 28 ultimately becomes the interior of the end product balloon, peripherally sealed, so as to retain the gas, such as helium, that is introduced into the completed balloon when it is used by the consumer.

As also can be seen, there is a heater 32 that has a hot head 34 at the upper portion thereof and the heater 32 is vertically movable by means such as piston 36. As shown, the hot head 34 can be located in the position of Fig. 2, that is, the hot head 34 is displaced away from contact or heat transmitting relationship with the nylon film 26.

One surface of the sound module 12, shown as the lower surface 38, has applied thereto a thin (in the order of microns) layer of a material that can be activated or made adhesive by the application of heat, such as a heat activatable adhesive or polyethylene itself that softens and melts upon the application of the heat and bonds to another polyethylene surface. That activatable layer can be bonded to the surface 38 using any number of conventional processes (heat or cold lamination), it only being of importance that at least a portion of the lower surface 38 has a heat activatable layer so that, as will be seen, the affixation of the sound module 12 to the polyethylene layer 28 of the nylon film 26 results in a joining of the surfaces to produce a bonding of those surfaces that is strong and permanent. That portion of the lower surface 38 of the sound module, can, of course be only the peripheral area of the sound module. As also can be noted, there is a 10 sheet of a protective material 40, such as polytetrafluoroethylene (Teflon), that is interposed between the hot head 34 and the nylon film 26 to allow in the transfer of heat from the hot head 34 to the nylon film 26 while preventing sticking.

Turning briefly to Fig 3, there can be seen a perspective view of the apparatus used to carry out the present invention and where the pick up head 20 has been lowered so that the sound module 12 is laying atop of the polyethylene layer 28 of the nylon film 26.

In Fig. 4, there can be seen a side view showing the sound module 12 sandwiched between the pick up head 20 and the polyethylene layer 28 of the nylon film 26. As also can be seen, the hot head 34 had been raised vertically so that pressure can be applied as 10 well as heat to the nylon film 26 and the sound module 12 and the pressure is maintained at a predetermined temperature for a predetermined time to complete the weld to permanently bond the sound module 12 to the nylon film 26 and a seal has been effected between the respective surfaces of the nylon film 26 and the sound module 12.

Turning finally to Fig 5, there is shown a perspective view of the apparatus for carrying out the present invention and where the pick up head 20 has been raised vertically and the vacuum has been vented so that the pick up head 20 has freed itself from the sound module 12. The hot head 34 has been returned to its lowered position and 10 the nylon film 26 now with the sound module 12 permanently welded thereto can advance to the further conventional steps in the manufacture of a balloon, that is, another nylon film, the same as the nylon film 26 is overlaid over the nylon film 26 and a heat seal, in the outline of the balloon is created with the sound module 12 captured in the completed balloon envelope. The upper nylon film is, of course, the same material as the nylon film 26 with a polyethylene layer forming the interior of the balloon and the metalized surface forming the outer surface of the completed balloon.

It is to be understood that the invention is not limited to the illustrated and described form of the invention contained herein. It will be apparent to those skilled in the art that various changes may be made without departing from the scope of the invention and the invention is not considered limited to what is shown in the drawings and described in the specification.